

simply sees the heavy labouring of the wings as the fish patiently whirrs along its even, uneventful way, "graceful" and "light" are terms misplaced. Strenuous, persistent, plodding effort is the impression left upon the mind, the least failure in which effort means plunging into the water. One often sees this happen obviously without intention on the fish's part.

In conclusion, it is, I think, made clear:—

1. That flying-fish would require to have a wing-area several (and probably many) times greater, according to their weights, than they actually possess to enable them to accomplish sailing flight in even such a restricted form as that carried out by sailing birds.
2. That we know of no parallel case in nature which would justify the assumption that the possession by these fishes of even such increased wing-area would of necessity enable them to sail long distances—(a) horizontally, or (b) close to an obstruction (the sea), or (c) in defiance of the direction of the wind; much less all three (a), (b), and (c) combined, as they commonly fly.
3. That their common flight is exactly what is to be expected of flyers holding, as they do, a very low wing to weight ratio—flyers capable of, and of necessity employing, extreme wing-speed.

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XXII.—A new *Heterotanais* and a new *Eurydice*, *Genera of Isopoda*. By Canon A. M. NORMAN, M.A., D.C.L., I.L.D., F.R.S., &c.

[Plates V. & VI.]

Genus *HETEROTANAIS*, G. O. Sars.

The genus *Heterotanais* was established by Sars in 1880 ("Revision af Gruppen: Isopoda Chelifera," Arch. f. Math. og Naturv. p. 28), and four species were assigned to it:—*Heterotanais Örstedii* (Krøyer), Scandinavian; *H. anomalus*, sp. n., Mediterranean; *H. limicola* (Harger), N.E. American; and *H. tenuis* (Thomson), New Zealand. More recently M. A. Dollfus ("Campagnes de la 'Melita,' Tanaidæ &c.," Mém. Soc. Zool. de France, vol. xi. 1898, pp. 37-47) has assigned

two more species to the genus—*H. algiricus*, from Algeria, and *H. provincialis*, from Golfe de Saint-Tropez. The species now to be described comes nearest to *H. Örstedii*.

*Heterotanais Gurneyi*, sp. n.  
(Pl. V. figs. 1-7; Pl. VI. fig. 1.)

*Heterotanais* sp. (?), Robert Gurney, "The Fresh- and Brackish-Water Crustacea of East Norfolk," Trans. Norfolk and Norwich Naturalists' Soc. vol. vii. 1904, p. 650.

Mr. Robert Gurney, in his excellent paper on the fauna of the Broads &c. of Norfolk, indicated as above a Tanaid which he had found in brackish water. He was subsequently so kind as to send me a male specimen and also drawings of the female, with a request that I would describe the species; from that specimen and the drawings the following characters are given.

The length of the female is equal to about five times that of the breadth, and the breadth is nearly equal throughout. The cephalosome is as long as the first three segments of the mesosome and half of the fourth; the fourth and fifth segments of the mesosome are the longest; and the metasome equals the two and a half preceding segments in length. The antennules are three-jointed, the first exceeding in length the two distal joints combined. The cheliped is almost exactly like that of *H. Örstedii*, the thumb having three crenations and as many setæ. The second pair of legs have the characteristic formation usual in the genus.

The male has the cephalosome produced and very compressed, narrowed greatly in front to the region of the eyes. The metasome is fully equal in length to half the mesosome. The antennules consist of five articulations, of which the terminal is the shortest, and the second nearly equals the combined lengths of the last three. The cheliped in general structure resembles that of *H. Örstedii*, but as seen from the outside the carpus is not projected so far forwards, while the thumb-process is of entirely different form, (not narrowed at the base, and thence widening, but) narrow throughout its length and of subequal breadth, until near its termination it is bent forwards, and pointed at the extremity. The uropods have the outer branch minute, two jointed; the inner four-jointed, the two distal joints being subequal to the second in length.

This species very nearly resembles *H. Örstedii* in most

particulars, but the thumb of the cheliped is of widely different form.

*Hab.* Procured by Mr. Robert Gurney at Six-mile House, on the Bure, and also at Reedham, on the Yare, Norfolk.

*Heterotanais Örstedii* (Kröyer).

(Pl. VI. figs. 2, 3.)

1842. *Tanais Örstedii*, Kröyer, Naturhist. Tidssk. vol. iv. p. 183; Voyages en Scand. &c. pl. xxxi. figs. 3 a-l. ♀.

1842. *Tanais curculio*, Kröyer, l. c. p. 184; Voyages &c. pl. xxx. figs. 4 a-h. ♂.

1852. *Tanais balticus*, Friedrich Müller, "Tanais rhynchites and balticus neue Arten aus der Ostsee," Archiv f. Naturg. 18 Jahrg. p. 89. ♀.

1852. *Tanais rhynchites*, Friedrich Müller, l. c. p. 88. ♂.

1896. *Tanais Örstedii*, G. O. Sars, Crust. Norway, II. Isopoda, p. 14. pl. vi. ♂ ♀.

In this species the thumb or "posteriorly-pointing lappet" of the cheliped of the male is narrow at the base, and widening thence in clavate form has the extremity truncated, with a little notch near the anterior corner. It is similarly represented in the figures of Kröyer, Müller, and G. O. Sars, and the figures given by Müller are here reproduced (Pl. VI. figs. 2, 3) for comparison with the better-known illustrations of Sars. These drawings will show how much this appendage differs from that of *H. Gurneyi*.

*Heterotanais Örstedii* is recorded from Öresund (*Kröyer*); Baltic, at Landskrona and Westervic (*Lilljeborg*); Prussia, at Greifswalde (*Müller*); Bohuslän (*Lilljeborg*); Christiansand (*Boeck*); and Iddefjord, at Fredrikshald, Norway (*G. O. Sars*). Specimens in my own collection are from Landskrona (*Lilljeborg*) and Denmark (from Copenhagen Museum).

Genus EURYDICE, Leach.

*Eurydice rotundicauda*, sp. n.

(Pl. VI. figs. 4-7.)

Antennules a little shorter than the peduncle of the antennæ; flagellum consisting of four articulations, combined length of the three distal slightly less than that of the first, which is wholly devoid of the dense covering of downy setæ

usual in species of the genus ; last joint furnished with a few setæ at the extremity.

Antennæ with the last joint of the peduncle much longer than the penultimate, much constricted at the base.

First feet with the fourth joints very small. There are five spines on the third joint, one on the fourth joint, and four on the hand.

The last legs are wholly devoid of spines on the face of the limb ; the ends of the joints are truncate, the third not at all produced downwards behind.

The telson is broader than long, very widely and evenly rounded at the extremity, and furnished with about sixteen serrulations of equal size, alternating with setæ. Uropods longer than the telson and reaching to some distance beyond its extremity ; both inner and outer branches bear two small distal spines, buried among the fringing setæ.

The broad telson, with its widely rounded and distally serrulated extremity and absence of spines or of lateral serrulations larger than the others, at once distinguishes this species from its allies. The forms nearest to it are *E. pulchra* and *E. inermis* ; but in the former the extremity is not nearly so wide and two pairs of spines are present among the serrulations, while in the latter the extremity is not equally rounded, the outermost serræ are somewhat larger than the others, and the uropods are distinctly shorter than the telson. The specimen is a female.

The type here described was dredged by the 'Porcupine' in 1869, but unfortunately no number of the dredging is with the specimen, and therefore the nearest approach which can be given as the habitat is Eastern North Atlantic.

#### EXPLANATION OF THE PLATES.

##### PLATE V.

- Fig. 1.* *Heterotanais Gurneyi*, sp. n., ♀, dorsal view.  
*Fig. 2.* " " Cheliped, ♀.  
*Fig. 3.* " " Chela of cheliped, ♀.  
*Fig. 4.* " " Second leg, ♀.  
*Fig. 5.* " " Antennule, ♂.  
*Fig. 6.* " " Cheliped, ♂, inner face.  
*Fig. 7.* " " " " outer face.

##### PLATE VI.

- Fig. 1.* *Heterotanais Gurneyi*, sp. n. Uropod, ♂.  
*Fig. 2.* *Heterotanais Örstedii*, Kröyer. Cheliped, ♂, inner face. After F. Müller.

- Fig. 3. *Heterotanis Örstedi*, Kröyer. Cheliped, ♂, outer face. After F. Muller.
- Fig. 4. *Eurydice rotundicauda*, sp. n. Antennules and antennæ.
- Fig. 5. " " First leg.
- Fig. 6. " " Seventh leg.
- Fig. 7. " " Telson and uropods.

## PROCEEDINGS OF LEARNED SOCIETIES.

## GEOLOGICAL SOCIETY.

April 5th, 1905.—J. E. Marr, Sc.D., F.R.S.,  
President. in the Chair.

The following communication was read:—

‘On the Divisions and Correlation of the Upper Portion of the Coal-Measures, with special reference to their Development in the Midland Counties of England.’ By Robert Kidston, F.R.S. L. & E., F.G.S.

The following classification of the Coal-Measures is proposed by the Author:—

<i>Proposed Names.</i>	<i>Names previously used.</i>
4. Radstockian Series	= Upper Coal-Measures.
3. Staffordian Series	= Transition-Series.
2. Westphalian Series	= Middle Coal-Measures.
1. Lanarkian Series	= Lower Coal-Measures (including the Millstone-Grit).

The Staffordian Series includes the Blackband Group beginning with the Bassey-Mine Ironstone, the Etruria-Marl Group, nearly barren of plant-remains, and the Newcastle-under-Lyme Group. The Radstockian Series includes the Keele Group and various beds in the Midland Coalfields hitherto referred to the Permian System. A classified table is given of all the plants known from the two upper Series in the Potteries Coalfield, and a list of those observed in the Newstead boring, Trentham. The plant-yielding beds in the shaft of the Hamstead Colliery, near Birmingham, between the depths of 243 and 411 yards from the surface, are undoubtedly referable to the Radstockian Series and to the Keele Group of the Potteries Coalfield; and the beds without plants, from 209 yards downward, belong to the same group. A bed at 440 yards is referable to the Newcastle Group. A list of these plants is given. These two Series are recognizable in Denbighshire; and the